DNRE

CHARLEVOIX FISHERIES RESEARCH STATION

2010 FIELD SEASON NEWSLETTER

February 2011

Produced by Bryce Kucharek and Patrick O'Neill

The Charlevoix Fisheries Research Station (CFRS) staff and research vessels are employed to provide information, models and advice to make possible science-based management of Michigan's fishery resources. CFRS is responsible for MDNRE Fisheries Division research needs for the Lake Michigan basin. This annual newsletter is designed to summarize most of the field and lab activities completed during the last year by the CFRS staff. *[Note: Sample processing and data analysis are incomplete for some 2010 sampling activities. In those cases, complete results for 2009 surveys are presented.]*

RESEARCH STATION HISTORY

The first official fisheries work that was conducted on the current site started in 1894 with a small federal fish hatchery. In 1900 the Coast Guard Life Saving Station was completed on the Pine River Channel.

The new Federal Hatchery, which currently houses the Charlevoix Fisheries Research Station, was built in 1918. For more than 40 years, the facilities were employed in raising whitefish, lake trout, and other fishes. In 1964, the new U.S. Fish and Wildlife Service (USFWS) Jordan River National Fish Hatchery located in Elmira was opened and fish production in Charlevoix was slowed to a halt. The Department of Natural Resources assumed responsibility of the facility in 1967 to house their new Lake Michigan Research Station. At that point, the new research vessel the S/V "*Steelhead*" had a home port.

CODED WIRE TAGGING

CFRS staff who run the Coded Wire Tag (CWT) program have continued to mark fish in the 2010 year. At the Platte River State Fish Hatchery, approximately 745,000 Chinook salmon were adipose fin clipped and marked with CWT by Charlevoix personnel and the USFWS's mass marking trailers. That was an increase of about 437,000 tagged Chinook salmon smolts from last year. In addition, almost 60,000 rainbow trout from Wolf Lake State Fish Hatchery were marked with a CWT (see photos below), along with 7,000 plus lake sturgeon from three streamside rearing facilities (Black River, Cedar River and Whitefish River).

CFRS staff and volunteers again managed to attend five tournaments in 2010; this allowed for observation of >5,000 trout and salmon, from which 230 CWT fish heads were collected. Both number of fish observed and the number of heads collected were down in 2010, primarily due to a continuing reduction in the number of registered tournament boats. However, attending these tournaments is still the most efficient method of sampling because of the large number of fish observed in a short period of time.

In 2009/10, CWT samples were collected from the following sources: DNRE/Tribal assessment samples (3%), sport fisheries (60%), and harvest weirs (37%). The total number of fish processed in 2009/10 (2,300) was lower than the average for the period 1990–2008. All CWT fish heads were checked for tags and, when present, tags were removed, read, and recorded in a database. This data was then provided to other researchers and managers (both within and outside the MDNRE) for additional analysis and modeling applications, as requested. Data is also posted for public access on the MDNRE internet site (http://www.michigan.gov/dnr/0,1607,7-153-10364_52259_10949_11238-171648--,00.html).

CHARTER BOAT SURVEY

The objective of the state-wide Charter Boat Program is to obtain a continuous annual record of charter boat fishing effort, harvest, and harvest rate of the major sport fish in the Michigan waters of the Great Lakes.

In 2009, a total of 51,568 charter anglers participated in 12,578 excursions on the Michigan waters of Lakes Michigan, Huron, Erie, Superior, and the St. Clair system (including the major tributaries), and spent 291,919 angler hours fishing. That is over a 12% decrease in charter fishing for the second consecutive year. Charter operators reported 134,535 fish harvested from the Michigan waters of the Great Lakes, with the following harvest by species: Chinook salmon (55,528-down 20%), walleye (22,969-down <1%), lake trout (20,079-down 12%), yellow perch (17,757-up 4%), rainbow trout (8142-up 5%), coho salmon (7017-up 5%), and brown trout (387-down 33%). Detailed charter fishing results for the 2009 season are available on the MDNRE internet site http://www.michigan.gov/dnr/0,1607,7-153-10364_52261_47568-91504--,00.html).

Also in 2010, CFRS personnel made presentations explaining charter survey results at Michigan Sea Grant workshops, Michigan Charter Boat Association meetings, fisheries workshops, MDNRE Citizen's Advisory Meetings, and other public and agency meetings.

MICHIGAN STATEWIDE ANGLER SURVEY PROGRAM

The objective of the Statewide Angler Survey Program (SASP) is to monitor trends in Michigan's sport-fishery through collecting continuous records of angler effort, catch and catch rates. Data are collected by 33 field clerks at all the major Great Lakes ports and various tributaries and inland lakes. During winter of 2010, the SASP conducted surveys in Saginaw and Keweenaw Bays, Little Bay de Noc, Les Cheneaux Islands, Lake Gogebic, Big Manistique Lake, Indian Lake and Mullett Lake. During the summer, surveys were conducted at the major ports of Lakes Michigan, Huron, Erie and Superior, as well as on the St. Joseph, Betsie and St. Mary's Rivers. Inland creel surveys were conducted at Mullett, Indian and Portage Lakes.

Information collected during these surveys is used by fisheries managers and researchers to monitor angling trends, identify potential management issues, supplement data on fish populations, and evaluate fishing regulations and stocking strategies. Great Lakes creel and Charter boat data

are available online at: http://www.dnr.state.mi.us/chartercreel/.

WEIR HARVEST

Every year the CFRS staff assists in the harvest, bio-sampling and evaluation of salmonid returns to weirs in Michigan's waters of the Great Lakes. The objective is to annually monitor and record returns of Chinook salmon, coho salmon, and steelhead trout to Michigan weir operation facilities, provide annual estimates of size-at-age, collect data and report on contracted salmon harvest operations and to provide annual data summaries of weir returns to be used in Management Unit reports, Great Lakes Fishery Commission (GLFC) reports, MDNRE web site updates, and for distribution to interested researchers and the public.

Returns of Chinook salmon to Lake Michigan and Lake Huron harvest facilities were well below the long-term average. In 2009, just over 16,300 Chinook salmon were harvested from four Michigan Weirs, 45% down from the 23 year average of 29,949. Lake Huron, on the other hand, was down 79% from its 23 year average at 3,930. Returns of coho salmon to Lake Michigan weirs in 2009 were up almost 30% (16,430) from 2008 but still well below the 25 year average. Data collection for 2010 weir returns is still being analyzed.

The Medusa weir, which is managed by CFRS staff, is primarily a harvest weir that is operated by the salmon harvest contractor (currently American Canadian Fisheries, Bellingham WA). Chinook and coho salmon found in the Great Lakes will die following spawning. This is why it is vital to have a collection process that will utilize these thousands of salmon that will be dead within weeks. Typically during the salmon run, harvests are conducted every two to three days; all the while, fishermen converge to the Charlevoix area to participate in the great salmon fishing.

Fortunately, because of our proximity to the Medusa facility, CFRS staff can do much of the bio-sampling (i.e.; recording length and weight, collecting CWT heads and OTC tail samples) needed right here in Charlevoix, saving staff time at the weir processing facility (see photo below). Area school groups make regular visits to tour the weir facility and learn about the life cycle of the Chinook salmon.

In addition to the fall harvest, the Medusa weir in Charlevoix plays a vital roll in the spring, when hundreds of thousands of four-inch Chinook salmon "smolts" are acclimated to the lake system for about three weeks. This acclimation period has been proven to increase survival of both steelhead and salmon. Twice a day, staff head down to the weir to inspect and feed these fish. Just after Memorial Day, the fish are released at night and start their two to three year growth spree before returning as mature salmon.

SMALL VESSEL ACTIVIES

R/V Pimephales

Spring Larval Sampling. The schedule for the CFRS small boat *R/V Pimephales* started shortly after ice out. Netting of larval fish, both nearshore and offshore, was completed in Elk Rapids, followed by Charlevoix. The objective in Elk Rapids was to determine peak hatch and abundance of *Coregonus* (whitefish) species. This year the peak spawn seemed to be at two different times, the second week of April and the first week of May. However, determining the peak spawn could be difficult due to the low catch rates we had this year.

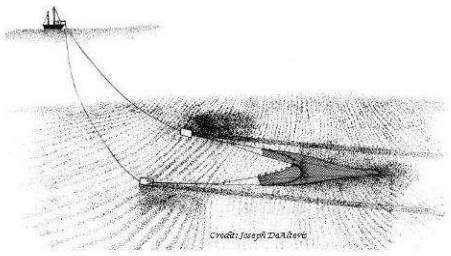
Larval Whitefish and Yellow Perch

As the spring progresses we move our larval sampling up to the Charlevoix area. For the past three years, CFRS staff has been trying to determine the potential contributions that drowned river-mouths such as Lake Charlevoix have made to the Lake Michigan yellow perch population. The objectives are to document peak hatching, which has occurred between mid and late June, and evaluate movement of larval fish between Lake Charlevoix and Lake Michigan.

Juvenile Whitefish / Cisco Sampling. From May through July, staff head down to Elk Rapids on a bi-monthly basis to sample juvenile lake whitefish and cisco (lake herring). The sampling techniques used are mini-fyke nets and seines. At this time of year, the juvenile fish are growing at a rapid rate and are a significant component of the near shore fish community. The objectives of this sampling are to determine lake whitefish and cisco population numbers, and to evaluate interactions with other near-shore Lake Michigan fish, including predators.

Small Boat Bottom Trawls. The CFRS staff, with assistance from area DNRE fisheries personnel, conducts annual yellow perch assessments according to established multi-agency lake-wide assessment protocols. In 2010, most fisheries agencies around Lake Michigan observed an increase in age-0 yellow perch abundance. Preliminary analysis

of 2010 bottom trawl data indicates that the 2010 yellow perch year class is the second most abundant (behind only the 2005 year class) in our 1996-2010 time series, with average trawl catch rates of greater than 400 YOY yellow perch per hour of trawling.



On an annual basis, we attempt to sample for two nights during dusk and dark at the following ports: South Haven, Grand Haven, Pentwater and Charlevoix/Petoskey. The trawl we use has a 15 foot wide by one foot high opening. The net is designed to stay open by using doors or "otter boards" which work much the same way as a planer board, except that the doors sink the net to the bottom. The fish that are not fast enough to escape the moving net, which is moving about 3 mph, are then herded toward the back. Once the trawl is retrieved to the boat, the back end of the net (which is called the "cod" end) is then opened and the fish are dumped out.

Sorting through small boat trawls

Lake Trout Egg Abundance Project. In the fall of 2000 the CFRS staff (MDNRE), Little Traverse Bay Bands of Odawa Indians (LTBB), the Department of Fisheries and Oceans (Canada) and the University of Vermont were funded to study lake trout spawning behaviors on multiple spawning sites in Lakes Michigan, Champlain and Huron (Georgian Bay). This study documented things like adult spawner abundance, egg deposition, egg predator abundance, and substrate quality.

Since the completion of this project, CFRS, LTBB and Grand Traverse Bay Band staffs have continued to sample four near-shore lake trout spawning sites (Menonaqua and Bay Harbor in Little Traverse Bay, and Elk Rapids and Ingalls Point in Grand Traverse Bays). Thirty egg nets are buried annually at each site in September (prior to spawning activity) and then retrieved after spawning in mid-November. The work-up of the egg nets then occurs, keeping track of all eggs and egg predators (i.e.-gobies and crayfish). In 2010, we saw a drop once again in the number of lake trout eggs present; however, the number of potential predators went down as well. Although the exotic round goby still makes up the majority of the predators found in the egg nets, another exotic, the rusty crayfish, seemed to be present in higher numbers this year. For the fifth year in a

row, the native sculpins are nowhere to be found.

Exotic round goby

Cisco Project, Elk Rapids. Over the past few years, CFRS staff have completed extensive survey and research work on the active spawning grounds just outside the port of Elk Rapids in Grand Traverse Bay. Discovery of a remnant spawning stock of cisco (lake herring) in this area has prompted researchers from CFRS to join a multiple agency project that is investigating cisco in Lakes Huron, Michigan and Superior.

The objectives are to examine annual variability in larval abundance and larval production per spawner, correlate larval densities with year-class strength, and test the hypothesis that growth potential at the larval stage and not predation is the dominant factor governing recruitment variability.

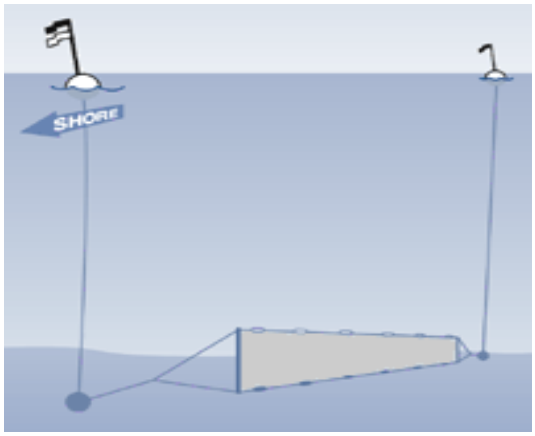
In the fall of 2010, staff at the CFRS finished up the final fall sampling period by setting three 1,000 foot, 4.5" mesh monofilament gill nets every other week from the first week of October until mid-December. The data gathered here have allowed us to correlate adult cisco abundance on the Elk Rapids spawning reef with later juvenile cisco production. Also, staff used the *R/V Pimephales* and conducted a hydro- acoustic survey (extremely accurate fish finder) just off the spawning reef to determine adult abundance.

LARGE VESSEL ACTIVITIES

S/V Steelhead

Lakewide Assessment Plan. Each spring, the CFRS vessel *S/V Steelhead* conducts a survey of the Lake Michigan fish community in a coordinated effort with other states and tribal agencies. The main goal is to determine relative abundance of lake trout, lake whitefish, burbot, and yellow perch. While achieving this goal, we also collect biological information on these species to determine growth and maturity, diet, and fish health and condition. In addition, samples from this survey are often provided to other agencies and universities; for example, in 2010 we collected yellow perch for mercury contaminant sampling for students from Michigan State University. Fish are collected from 6 locations (South Haven, Saugatuck, Grand Haven, Arcadia, Leland, and Charlevoix). Net locations at these ports are randomly selected a certain distance from the piers. Two days of netting are required at each port, a day of netting north of the pier and one south of the pier. Due to reductions in our budget, Charlevoix and Leland were not sampled in 2010.

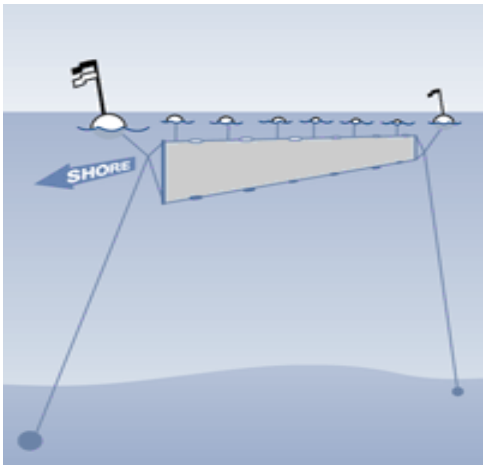
Sampling gear used for this survey consists of 8,000 feet of 6 feet high bottom gill nets that range from 1.5 inch mesh size (to capture small fish) to 6 inch mesh size (to capture large fish).



The S/V Steelhead usually leaves Charlevoix the last week of March. For this reason, we usually begin the survey in the southern end of the lake and work our way north. In 2010, we collected 760 lake trout. The majority of those were caught near South Haven (245) and Saugatuck (272). Lake whitefish catch was 1,036 fish and over 70% of those were caught out of Saugatuck. We caught 19 burbot of which 12 were caught in the southern end of the lake. We had a good catch of yellow perch (1009) this year. Just like last year, most of these fish we caught this year came from South Haven and Grand Haven. The yellow perch population declined dramatically in the early 1990s and recently we have seen some increases. The fishing has picked up the last few years and more people are targeting them again. Most of the yellow perch caught this year were 5 year old fish (2005 year class), and a lot of them are getting big enough to please Lake Michigan perch anglers, and some anglers are reportedly doing quite well.

Lake Trout

Chinook Salmon Natural Reproduction Study. 2010 was the second year of an expanded study (in collaboration with MSU) to measure how many naturally-reproduced Chinook salmon are present in Lake Michigan. Starting in 2006, every Chinook salmon that was stocked into Lake Michigan was fed an antibiotic that leaves a fluorescent mark on bony structures; this mark can only be seen using a specially-equipped microscope. To determine the ratio of naturally-reproduced fish to hatchery fish, we collected age-1 Chinook salmon during late spring using gill nets that are suspended high in the water column. The graphic below shows what our net would look like if viewed under water.



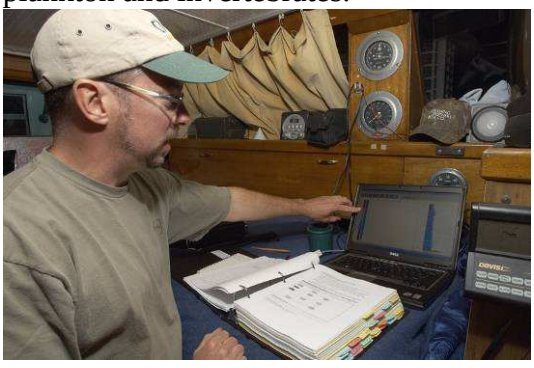
During this time of year, most young salmon are concentrated in the warmer waters in the southern end of the lake and that is where we put most of our effort. Many samples are also collected from fish captured during fishing tournaments and at weirs. To determine whether the fish is a hatchery product or was spawned naturally, we collect vertebrae from each fish and use UV light to look for a fluorescent mark. CFRS staff collected 76 samples from salmon captured during our vessel survey. Statewide, MDNRE collected about 600 samples. Samples are still being processed and results are pending. Analysis of samples from previous years indicates that almost 50% of the Lake Michigan Chinook salmon population is wild fish.

Acoustic Survey. A lakewide prey fish survey is conducted in collaboration with the US Geological Survey (USGS) in the late summer/early fall each year. Our research vessel collects data in the Michigan waters of Lake Michigan and the USGS collects data in the Wisconsin / Illinois / Indiana waters. Sophisticated sonar is used to collect information that is stored on a computer.

Data is collected on predetermined courses/transects and the number of prey fish are counted for that area.

Setting the midwater trawl

Trawls with sensors attached let us know where the trawl is in the water column. This allows us to deploy the trawl at the depth we are seeing fish on the sonar unit, to determine what species of fish are present. The number of fish seen on these transects is extrapolated out to get a lakewide estimate of the number and weight of prey fish by species in Lake Michigan. This work is done at night when prey fish move up in the water column to feed on various forms of plankton and invertebrates.



Acoustic transects surveyed by CFRS totaled 100 miles in length and included midwater trawling and mysid (shrimp like invertebrates) sampling at 11 offshore locations ranging from South Haven to the Fox Islands. The length of the transects were reduced this year due to budget reductions. This year was a great year for alewife recruitment with

the second highest young of the year age class since 1998. This resulted in a slight increase in the overall baitfish biomass. Bloater chub numbers and recruitment appear to be similar to last year, and we expect to see increases in adult bloaters in the near future. This year we had a couple nights of rough seas, but for the majority of the survey we had excellent weather.

Large vessel bottom trawling. The *S/V Steelhead* was able to get back into sampling the yellow perch populations throughout Lake Michigan using bottom trawls after one year off due to budget and scheduling conflicts. The ports sampled are the same as those sampled by the *R/V Pimephales* (South Haven, Grand Haven, Pentwater and Petoskey); however the depths to be sampled are deeper (30, 40, 60, 80 and 100 feet). The bottom trawl used is 40 feet wide and has 5 foot doors, so dragging that through the water does require a very large/powerful vessel.

As might be expected, dragging a net along the bottom of the lake has the tendency to collect not only fish but also other bottom-dwelling organisms, such as this haul of quagga mussel. Once on board, the tedious task of separating fish from mussels begins.

A large pile of quagga mussels

Nutrient Transfer Study. The *S/V Steelhead* and the *R/V Pimephales* were part of a large new study in 2010 in cooperation with USGS that studied how nutrients move up through the food chain. Samples were taken monthly from April through October at two different sampling locations. Samples were taken near Frankfort on the Michigan side and Sturgeon Bay on the Wisconsin side of the lake. The *S/V Steelhead* sampled in Frankfort in August and at both locations in September and October. The *R/V Pimephales* did near shore plankton and larval fish tows near Frankfort in May, June, and July. The rest of the sampling was done by USGS and NOAA. Sampling included evaluation of water quality, as well as abundance of plankton, mysids, larval fish, and adult prey fish. Midwater trawls were used to target prey fish such as alewives and bloater chubs. One of the objectives of this study was to help in the understanding of the impact that invasive species have on native invertebrates like mysids.

Bythotrephes

Mysid net

OTHER ACTIVITES

Tribal Coordination Unit Musky Project. This spring, CFRS staff assisted the MDNRE Tribal Coordination Unit in completing the final year of the muskellunge movement study with the University of Michigan. The objective is to collect, tag with a sonic transmitter, and track muskies within the Antrim County Chain-of-Lakes. These sonic transmitters, which are slightly larger than a AA battery, are surgically implanted into the fish's body cavity.

In 2008, eleven muskies were tagged, of which eight were with sonic transmitters and three with jaw tags. In 2009, eleven fish were tagged with a sonic transmitter. During the spring of 2010, nine muskies were caught; 4 were recaps from previous years, and 5 received the sonic transmitter tags. Notice the incision on the female musky that was tagged and released below.

State Wide Stocking Program. Every year, staff from the CFRS assists in the stocking of trout and salmon from state hatchery facilities to designated lakes

and rivers. In 2010, CFRS staff delivered rainbow trout from the Oden Hatchery (near Petoskey, MI) to the Muskegon River (Newaygo County), Pickerel, Ford and West Lost Lakes (Otsego County), Au Sable River (Alcona County), Shupac Lake (Crawford County), and Big Chub and Heart Lakes (Otsego County).

Mullett Lake Sturgeon sampling.

Mullett Lake Survey. CFRS staff assisted the Michigan DNRE and Michigan State University in conducting a large-mesh gillnet survey of Mullett Lake during July, 2010. The purpose of the survey was to gain insight into sturgeon distribution and abundance within the lake. Overall, the number of sturgeon captured was low compared to similar survey efforts in Black Lake. The total number of unique fish captured was 70. In comparison, a three week survey effort in Black Lake in 2007 captured a total of 194 lake sturgeon.

Due to the fact that the project leader Ed Baker and his crew were having trouble capturing a lake sturgeon, another crew placed the following sturgeon in his net. Always enjoy what you do!

Beaver Island Smallmouth Bass Study.

Beaver Island / Waugoshance Point Survey. CFRS staff once again assisted Central Michigan University (CMU) in conducting a smallmouth bass population and movement study in the waters around the Beaver Island Archipelago and Waugoshance Point area. Three weeks of trap netting and fish movement tracking was conducted in early June and late July. Smallmouth bass collected in the trap nets were measured, age structure samples were taken, and fish were given a jaw tag before being released. Any recaptured fish – fish that were tagged in previous years – were measured for individual growth comparisons. Tag numbers of all fish captured were recorded to allow calculation of population size.

Net Repair. Each winter the vessel crew works endlessly to maintain the various nets we use, and to build new nets for upcoming projects. This year CFRS staff built two 40-foot and two 15-foot bottom trawls to be used for yellow perch sampling. Gill net construction and repair included 18,000 feet (almost 3.5 miles) of the bottom gill nets used for our spring LWAP study.

VHS sampling. By now it seems everyone has heard about or been affected by the new fish disease, Viral Hemorrhagic Septicemia (VHS). Lake Michigan is classified within the VHS Surveillance Management Area. This means that the disease has not been

clearly discovered in our waters of Lake Michigan, but could spread here, most likely from Lake Huron where it has been found. CFRS staff each year collects a number of fish species and sends either whole fish or tissue samples to the Michigan State University's Health Lab. This year we collected and sent 60 yellow perch and 60 alewife from South Haven. Tissue samples (spleen and kidney) from 60 lake whitefish were collected at Saugatuck. At Grand Haven we collected 60 yellow perch and 60 alewife, and we collected 11 whole yellow perch, 60 alewife, and 12 round goby from Arcadia. All samples came back negative for VHS.

Fish aging. One of the most time consuming and important activities occurring at the CFRS during winter months is determination of the age of fish sampled in our various lake surveys. Fish are aged to provide us with important information about a fish population, such as growth rates, age-at-maturity, age composition, mortality rates, or maybe even how many times certain fish spawn. This information can be used to make better management decisions for certain lakes or certain populations of fish. CFRS staff aged approximately 2,575 fish this past year, with many requiring second reads (two separate agers age the same fish to increase aging accuracy).

Fish can be aged using almost any bony structure. Some of the most popular are scales, spines, otoliths, and opercles. Scales and spines are advantageous because the fish doesn't have to be killed to collect the aging structure. Otoliths and opercles may be taken as well when fish will be sacrificed for other research purposes (e.g., contaminant sampling).

Community involvement. Outside of doing the day-to-day fisheries work, we at CFRS strive to play a large role in our community by getting involved in such activities as the United Ways "Day of Caring", DNRE golf scramble and (this year) our local library's "Scarecrow Challenge". We ended up getting first place with the "Musky Mangler" scarecrow!

Day of Caring-Conservancy property clean-up

DNRE Golf Scrabble-1st Place

Scarecrow Challenge-Muskie Mangler-1st Place

Public presentations. During 2010, CFRS staff made numerous presentations to inform public groups concerning station, Division, and Department activities. These included presentations to local Kiwanis and Rotary clubs, Michigan SeaGrant workshops, and various area school groups. We also hosted groups at the station, providing tours of our facilities and of the Medusa Creek salmon harvest facility. Groups and individuals who are interested in learning more about what we do are encouraged to contact the station for information, a presentation to your group, or to arrange a tour.

Charlevoix Fisheries Research Station
96 Grant Street
Charlevoix, MI 49720
231-547-2914 (PHONE)
231-547-6031 (FAX)

Web page:
http://www.michigan.gov/dnr/0,1607,7-153-10364_52259_10951_11301---,00.html

Email:
clappd@michigan.gov